IN THE CLAIMS:

1. – 31. (Canceled)

32. (Original) An apparatus to remove echo and crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, said apparatus comprising:

an adaptive correlator in communication with the communication medium to generate a plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by the receiver,

wherein the plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by the receiver during the current period and a signal transmitted by the transmitter delayed by a predetermined time; and

a finite impulse filter in communication with the receiver to filter the echo and crosstalk in accordance with the plurality of filter coefficients generated by said adaptive correlator.

33. (Original) An apparatus according to Claim 32, wherein the corresponding coefficients from the previous time period are weighted by a first predetermined weighing factor.

34. (Original) An apparatus according to Claim 32, wherein the product of the signal received by the receiver during the current period and the signal transmitted by the transmitter delayed by the predetermined time are weighted by a second predetermined weighing factor.

35. (Original) An apparatus according to Claim 32, wherein said adaptive correlator comprises:

a first delay circuit to delay the signal transmitted by the transmitter;

a first multiplier to multiply the signal received by the receiver during the current period with an output of said first delay circuit;

a second multiplier to multiply an output of said first multiplier by a first predetermined weighting factor;

a first adder;

a second delay circuit to delay an output of said first adder; and

a third multiplier to multiply an output of said second delay circuit by a second predetermined weighting factor,

wherein said first adder adds an output of said second multiplier to an output of said third multiplier.

36. (Original) An apparatus according to Claim 35, wherein the first predetermined weighting factor is a quotient of the second predetermined weighting factor divided by a variance of the signal transmitted by the transmitter.

37. (Original) An apparatus according to Claim 35, wherein the second predetermined weighting factor is an inverse of a number of a group of the signals transmitted by the transmitter.

38. (Original) An apparatus according to Claim 32, wherein said adaptive correlator comprises:

a first delay circuit to delay the signal transmitted by the transmitter;

a first shifter to shift the signal received by the receiver during the current period in accordance with an output of said first delay circuit;

a second shifter to shift an output of said first shifter in accordance with a first predetermined weighting factor;

a first adder;

a third shifter to shift an output of said first adder in accordance with a second predetermined weighting factor;

a second adder; and

a second delay circuit to delay an output of said second adder,

wherein said first adder adds an output of said second shifter to an output of said second delay circuit, and

wherein said second adder adds an output of said third shifter to the output of said second delay circuit.

39. (Original) An apparatus according to Claim 38, wherein the first predetermined weighting factor is an inverse of a variance of the signal transmitted by the transmitter.

40. (Original) An apparatus according to Claim 38, wherein the second predetermined weighting factor is an inverse of a number of groups of the signals transmitted by the transmitter.

41. (Original) A communication apparatus comprising:

a transmitter;

a receiver;

an adaptive correlator in communication with a communication medium to generate a plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said receiver,

wherein the plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by said receiver during the current period and a signal transmitted by said transmitter delayed by a predetermined time; and

a finite impulse filter in communication with said receiver to filter the echo and crosstalk in accordance with the plurality of filter coefficients generated by said adaptive correlator,

wherein said receiver receives a signal from said finite impulse filter simultaneously with the transmission of a signal by said transmitter on the medium.

42. (Original) An apparatus according to Claim 41, wherein the corresponding coefficients from the previous time period are weighted by a first predetermined weighing factor.

43. (Original) An apparatus according to Claim 41, wherein the product of the signal received by said receiver during the current period and the signal transmitted by said transmitter delayed by the predetermined time are weighted by a second predetermined weighing factor.

44. (Original) An apparatus according to Claim 41, wherein said adaptive correlator comprises:

a first delay circuit to delay the signal transmitted by said transmitter;

a first multiplier to multiply the signal received by said receiver during the current period with an output of said first delay circuit;

a second multiplier to multiply an output of said first multiplier by a first predetermined weighting factor;

a first adder;

a second delay circuit to delay an output of said first adder; and

a third multiplier to multiply an output of said second delay circuit by a second predetermined weighting factor,

wherein said first adder adds an output of said second multiplier to an output of said third multiplier.

45. (Original) An apparatus according to Claim 44, wherein the first predetermined weighting factor is a quotient of the second predetermined weighting factor divided by a variance of the signal transmitted by said transmitter.

46. (Original) An apparatus according to Claim 44, wherein the second predetermined weighting factor is an inverse of a number of a group of the signals transmitted by said transmitter.

47. (Original) An apparatus according to Claim 41, wherein said adaptive correlator comprises:

a first delay circuit to delay the signal transmitted by said transmitter;

a first shifter to shift the signal received by said receiver during the current period in accordance with an output of said first delay circuit;

a second shifter to shift an output of said first shifter in accordance with a first predetermined weighting factor;

a first adder;

a third shifter to shift an output of said first adder in accordance with a second predetermined weighting factor;

a second adder; and

a second delay circuit to delay an output of said second adder,

wherein said first adder adds an output of said second shifter to an output of said second delay circuit, and

wherein said second adder adds an output of said third shifter to the output of said second delay circuit.

48. (Original) An apparatus according to Claim 47, wherein the first predetermined weighting factor is an inverse of a variance of the signal transmitted by said transmitter.

49. (Original) An apparatus according to Claim 47, wherein the second predetermined weighting factor is an inverse of a number of groups of the signals transmitted by said transmitter.

50. (Original) A communication system comprising:

a first transceiver comprising:

a first hybrid;

a first transmitter in communication with said first hybrid;

a first receiver;

a first adaptive correlator in communication said first hybrid to generate a first plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said first receiver,

wherein the first plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by said first receiver during the current period and a signal transmitted by said first transmitter delayed by a predetermined time; and

a first finite impulse filter in communication with said first receiver to filter echo and crosstalk in accordance with the first plurality of filter coefficients generated by said first adaptive correlator,

wherein said first receiver receives a signal from said first finite impulse filter simultaneously with the transmission of a signal by said first transmitter to said first hybrid; and

a second transceiver comprising:

a second hybrid in communication with said first transceiver via a communication medium;

a second transmitter in communication with said second hybrid;

a second receiver;

a second adaptive correlator in communication said second hybrid to generate a second plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said second receiver,

wherein the second plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by said second receiver during the current period and a signal transmitted by said second transmitter delayed by a predetermined time; and

a second finite impulse filter in communication with said second receiver to filter the echo and crosstalk in accordance with the second plurality of filter coefficients generated by said second adaptive correlator,

wherein said second receiver receives a signal from said second finite impulse filter simultaneously with the transmission of a signal by said second transmitter to said second hybrid.

51. (Original) An apparatus to remove echo and crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, said apparatus comprising:

adaptive correlating means in communication with the communication medium for generating a plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by the receiver,

wherein the plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by the receiver during the current period and a signal transmitted by the transmitter delayed by a predetermined time; and

finite impulse filtering means in communication with the receiver for filtering the echo and crosstalk in accordance with the plurality of filter coefficients generated by said adaptive correlating means.

52. (Original) An apparatus according to Claim 51, wherein the corresponding coefficients from the previous time period are weighted by the first predetermined weighing factor.

53. (Original) An apparatus according to Claim 51, wherein the product of the signal received by the receiver during the current period and the signal transmitted by the transmitter delayed by the predetermined time are weighted by a second predetermined weighing factor.

54. (Original) An apparatus according to Claim 51, wherein said adaptive correlating means comprises:

first delay means for delaying the signal transmitted by the transmitter;

first multiplying means for multiplying the signal received by the receiver during the current period with an output of said first delay means;

second multiplying means for multiplying an output of said first multiplying means by the first predetermined weighting factor;

first adding means;

second delay means for delaying an output of said first adding means; and

third multiplying means for multiplying an output of said second delay means by second predetermined weighting factor,

wherein said first adding means adds an output of said second multiplying means to an output of said third multiplying means.

55. (Original) An apparatus according to Claim 54, wherein the first predetermined weighting factor is a quotient of the second predetermined weighting factor divided by a variance of the signal transmitted by the transmitter.

56. (Original) An apparatus according to Claim 54, wherein the second predetermined weighting factor is an inverse of a number of a group of the signals transmitted by the transmitter.

57. (Original) An apparatus according to Claim 51, wherein said adaptive correlating means comprises:

first delay means for delaying the signal transmitted by the transmitter;

first shifting means for shifting the signal received by the receiver during the current period in accordance with an output of said first delay means;

second shifting means for shifting an output of said first shifting means in accordance with first predetermined weighting factor;

first adding means;

third shifting means for shifting an output of said first adding means in accordance with the second predetermined weighting factor;

second adding means; and

second delay means for delaying an output of said second adding means,

wherein said first adding means adds an output of said second shifting means to an output of said second delay means, and

wherein said second adding means adds an output of said third shifting means to the output of said second delay means.

58. (Original) An apparatus according to Claim 57, wherein the first predetermined weighting factor is an inverse of a variance of the signal transmitted by the transmitter.

59. (Original) An apparatus according to Claim 57, wherein the second predetermined weighting factor is an inverse of a number of groups of the signals transmitted by the transmitter.

60. (Original) A communication apparatus comprising:

transmitting means for transmitting a signal;

receiving means for receiving a signal;

adaptive correlating means in communication with a communication medium for generating a plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said receiving means,

wherein the plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by said receiving means during the current period and a signal transmitted by said transmitting means delayed by a predetermined time; and

finite impulse filtering means in communication with said receiving means for filtering the echo and crosstalk in accordance with the plurality of filter coefficients generated by said adaptive correlating means,

wherein said receiving means receives a signal from said finite impulse filtering means simultaneously with the transmission of a signal by said transmitting means on the medium.

61. (Original) An apparatus according to Claim 60, wherein the corresponding coefficients from the previous time period are weighted by the first predetermined weighing factor.

62. (Original) An apparatus according to Claim 60, wherein the product of the signal received by said receiving means during the current period and the signal transmitted by said transmitting means delayed by the predetermined time are weighted by second predetermined weighing factor.

63. (Original) An apparatus according to Claim 60, wherein said adaptive correlating means comprises:

first delay means for delaying the signal transmitted by said transmitting means;

first multiplying means for multiplying the signal received by said receiving means during the current period with an output of said first delay means;

second multiplying means for multiplying an output of said first multiplying means by the first predetermined weighting factor;

first adding means;

second delay means for delaying an output of said first adding means; and

third multiplying means for multiplying an output of said second delay means by second predetermined weighting factor,

wherein said first adding means adds an output of said second multiplying means to an output of said third multiplying means.

64. (Original) An apparatus according to Claim 63, wherein the first predetermined weighting factor is a quotient of the second predetermined weighting factor divided by a variance of the signal transmitted by said transmitting means.

65. (Original) An apparatus according to Claim 63, wherein the second predetermined weighting factor is an inverse of a number of a group of the signals transmitted by said transmitting means.

66. (Original) An apparatus according to Claim 60, wherein said adaptive correlating means comprises:

first delay means for delaying the signal transmitted by said transmitting means;

first shifting means for shifting the signal received by said receiving means during the current period in accordance with an output of said first delay means;

second shifting means for shifting an output of said first shifting means in accordance with first predetermined weighting factor;

first adding means;

third shifting means for shifting an output of said first adding means in accordance with the second predetermined weighting factor;

second adding means; and

second delay means for delaying an output of said second adding means,

wherein said first adding means adds an output of said second shifting means to an output of said second delay means, and

wherein said second adding means adds an output of said third shifting means to the output of said second delay means.

67. (Original) An apparatus according to Claim 66, wherein the first predetermined weighting factor is an inverse of a variance of the signal transmitted by said transmitting means.

68. (Original) An apparatus according to Claim 66, wherein the second predetermined weighting factor is an inverse of a number of groups of the signals transmitted by said transmitting means.

69. (Original) An communication system comprising:

first transceiver means comprising:

first hybrid means for combining a received signal with transmitted signal;

first transmitting means for transmitting a transmitted signal to said first hybrid means;

first receiving means for receiving a received signal;

first adaptive correlating means in communication said first hybrid means for generating first plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said first receiving means,

wherein the first plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of a signal received by said first receiving means during the current period and a signal transmitted by said first transmitting means delayed by a predetermined time; and

first finite impulse filtering means in communication with said first receiving means for filtering echo and crosstalk in accordance with the first plurality of filter coefficients generated by said first adaptive correlating means,

wherein said first receiving means receives a signal from said first finite impulse filtering means simultaneously with the transmission of a signal by said first transmitting means to said first hybrid means; and

second transceiver means comprising:

second hybrid means for combining a received signal transmitted from said first transceiver means via a communication medium and a transmitted signal to said first transceiver means via a communication medium;

second transmitting means in communication with said second hybrid means; second receiving means;

second adaptive correlating means in communication said second hybrid means for generating second plurality of filter coefficients each period of time representing echo and crosstalk interference on a signal received by said second receiving means,

wherein the second plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a

product of a signal received by said second receiving means during the current period and a signal transmitted by said second transmitting means delayed by a predetermined time; and

second finite impulse filtering means in communication with said second receiving means for filtering the echo and crosstalk in accordance with the second plurality of filter coefficients generated by said second adaptive correlating means,

wherein said second receiving means receives a signal from said second finite impulse filtering means simultaneously with the transmission of a signal by said second transmitting means to said second hybrid means.

70. (Original) A method to remove echo and crosstalk interference from a received signal that is simultaneous received with a transmitted signal, said method comprising the steps of:

a) generating a plurality of filter coefficients each period of time representing echo and crosstalk interference on the received signal,

wherein the plurality of filter coefficients for a current time period are a weighted sum of corresponding coefficients from a previous time period and a product of the received signal during the current period and a transmitted signal delayed by a predetermined time; and

b) finite impulse filtering from the received signal the echo and crosstalk in accordance with the plurality of filter coefficients generated by said adaptive correlating means.

71. (Original) A method according to Claim 70, wherein the corresponding coefficients from the previous time period are weighted by the first predetermined weighing factor.

72. (Original) A method according to Claim 70, wherein the product of the signal received by the receiver during the current period and the signal transmitted by the transmitter delayed by the predetermined time are weighted by a second predetermined weighing factor.

73. (Original) A method according to Claim 70, wherein said generating step comprises the steps of:

a) delaying the transmitted signal;

b) multiplying the received signal during the current period with the delayed signal from step (a);

c) multiplying an output of step (b) by the first predetermined weighting factor;

d) adding an output of step (c) to an output of step (f);

e) delaying an output of step (d); and

f) third multiplying means for multiplying an output of step (e) by second predetermined weighting factor.

74. (Original) A method according to Claim 73, wherein the first predetermined weighting factor is a quotient of the second predetermined weighting factor divided by a variance of the signal transmitted by the transmitter.

75. (Original) A method according to Claim 73, wherein the second predetermined weighting factor is an inverse of a number of a group of the signals transmitted by the transmitter.

76. (Original) A method according to Claim 70, wherein said generating step comprises the steps of:

a) delaying the transmitted signal;

b) shifting the received signal during the current period in accordance with an output of step (a);

c) shifting an output of step (b) in accordance with first predetermined weighting factor;

d) adding an output of step (c) to an output of step (g) ;

e) shifting an output of step (d) in accordance with the second predetermined weighting factor;

f) adding the output of step(g) to an output of step (e); and

g) delaying an output of step (f).

77. (Original) A method according to Claim 76, wherein the first predetermined weighting factor is an inverse of a variance of the signal transmitted by the transmitter.

78. (Original) A method according to Claim 76, wherein the second predetermined weighting factor is an inverse of a number of groups of the signals transmitted by the transmitter.

79. (Previously Presented) The apparatus according to Claim 32, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiver during the current period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

80. (Previously Presented) The apparatus according to Claim 79, wherein β is substantially equal to an inverse of a number of transmitted symbols.

81. (Previously Presented) The apparatus according to Claim 41, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiver during the current period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

82. (Previously Presented) The apparatus according to Claim 81, wherein β is substantially equal to an inverse of a number of transmitted symbols.

83. (Previously Presented) The apparatus according to Claim 41, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiver during the current period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

84. (Previously Presented) The apparatus according to Claim 83, wherein β is substantially equal to an inverse of a number of transmitted symbols.

85. (Previously Presented) The apparatus according to Claim 50, wherein each of the first plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the first receiver during the current period,

b(k-j) is the signal transmitted by the first transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

86. (Previously Presented) The apparatus according to Claim 85, wherein β is substantially equal to an inverse of a number of transmitted symbols.

87. (Previously Presented) The apparatus according to Claim 50, wherein each of the second plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the second receiver during the current period,

b(k-j) is the signal transmitted by the second transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

88. (Previously Presented) The apparatus according to Claim 87, wherein β is substantially equal to an inverse of a number of transmitted symbols.

89. (Previously Presented) The apparatus according to Claim 51, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiver during the current period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

90. (Previously Presented) The apparatus according to Claim 89, wherein β is substantially equal to an inverse of a number of transmitted symbols.

91. (Previously Presented) The apparatus according to Claim 60, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiving means during the current period,

b(k-j) is the signal transmitted by the transmitting means delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

92. (Previously Presented) The method according to Claim 91, wherein β is substantially equal to an inverse of a number of transmitted symbols.

93. (Previously Presented) The apparatus according to Claim 69, wherein each of the first plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the first receiving means during the current period,

b(k-j) is the signal transmitted by the first transmitting means delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

94. (Previously Presented) The apparatus according to Claim 93, wherein β is substantially equal to an inverse of a number of transmitted symbols.

95. (Previously Presented) The apparatus according to Claim 69, wherein each of the second plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the second receiving means during the current

period,

b(k-j) is the signal transmitted by the second transmitting means delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

96. (Previously Presented) The apparatus according to Claim 95, wherein β is substantially equal to an inverse of a number of transmitted symbols.

97. (Previously Presented) The method according to Claim 70, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

C_j(k) is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received during the current period,

b(k-j) is the transmitted signal delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

98. (Previously Presented) The method according to Claim 97, wherein β is substantially equal to an inverse of a number of transmitted symbols.

99. (Previously Presented) An apparatus for removing near-end echo and near-end crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, comprising:

an adaptive correlator in communication with the receiver and the transmitter,

comprising:

a Least Mean Square (LMS) engine for generating a plurality of filter coefficients each time period,

wherein the plurality of filter coefficients for a current time period comprise a sum of a corresponding coefficient from a previous time period weighted by a first leakage factor and a product of a signal received by the receiver during the current time period and a time-delayed signal transmitted by the transmitter, wherein the product is weighted by a second leakage factor;

a Finite Impulse Response (FIR) filter in communication with the receiver and the adaptive correlator,

wherein the FIR filter reproduces the near-end echo and near-end crosstalk interference in the signal received by the receiver in accordance with the plurality of filter coefficients generated by the adaptive correlator; and

a combining circuit in communication with the receiver and the FIR filter,

wherein the combining circuit subtracts the reproduced near-end echo and near-end crosstalk interference from the signal received by the receiver.

100. (Previously Presented) The apparatus according to Claim 99, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the signal received by the receiver during the current time period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is the first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is the second leakage factor.

101. (Previously Presented) The apparatus according to Claim 100, wherein β is substantially equal to an inverse of a number of transmitted symbols.

102. (Previously Presented) An apparatus for removing near-end echo and near-end crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, comprising:

an adaptive correlator in communication with the receiver and the transmitter, comprising:

a Least Mean Square (LMS) engine for generating a plurality of filter coefficients each time period, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from a previous time period,

Cj(k+1) is the filter coefficient for a current time period,

x(k+1) is a signal received by the receiver during the current time period,

b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,

(1-β) is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor; and

a Finite Impulse Response (FIR) filter in communication with the receiver and the adaptive correlator,

wherein the FIR filter reproduces the near-end echo and near-end crosstalk interference in the signal received by the receiver in accordance with the plurality of filter coefficients generated by the adaptive correlator; and

a combining circuit in communication with the receiver and the FIR filter,

wherein the combining circuit subtracts the reproduced near-end echo and near-end crosstalk interference from the signal received by the receiver.

103. (Previously Presented) An apparatus for removing near-end echo and near-end crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, comprising:

a Least Mean Square (LMS) engine, in communication with the receiver and the transmitter, for generating a plurality of filter coefficients each time period,

wherein the plurality of filter coefficients for a current time period comprise a sum of a corresponding coefficient from a previous time period weighted by a first leakage factor and a product of a signal received by the receiver during the current time period and a time-delayed signal transmitted by the transmitter, wherein the product is weighted by a second leakage factor.

104. The apparatus according to claim 103, further comprising:

a Finite Impulse Response (FIR) filter in communication with the receiver and the LMS engine,

wherein the FIR filter reproduces the near-end echo and near-end crosstalk interference in the signal received by the receiver in accordance with the plurality of filter coefficients generated by the LMS engine; and

a combining circuit in communication with the receiver and the FIR filter,

wherein the combining circuit subtracts the reproduced near-end echo and near-end crosstalk interference from the signal received by the receiver.

105. (Previously Presented) The apparatus according to Claim 103, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$\mathbf{C_j(k)}$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,
x(k+1) is the signal received by the receiver during the current time period,
b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,
(1-β) is the first leakage factor,
σ^2 is a variance of a transmitted symbol, and
β/σ^2 is the second leakage factor.

106. (Previously Presented) The apparatus according to Claim 105, wherein β is substantially equal to an inverse of a number of transmitted symbols.

107. (Previously Presented) An apparatus for removing near-end echo and near-end crosstalk interference in a communication system having a receiver and a transmitter for simultaneous reception from and transmission to a communication medium, comprising:

a Least Mean Square (LMS) engine, in communication with the receiver and the transmitter, for generating a plurality of filter coefficients each time period,

wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

C_j(k) is the filter coefficient from a previous time period,
Cj(k+1) is the filter coefficient for a current time period,
x(k+1) is a signal received by the receiver during the current time period,
b(k-j) is the signal transmitted by the transmitter delayed by **j** delay units,
(1-β) is a first leakage factor,
σ^2 is a variance of a transmitted symbol, and
β/σ^2 is a second leakage factor.

108. (Previously Presented) The apparatus according to claim 107, further comprising:

a Finite Impulse Response (FIR) filter in communication with the receiver and the LMS engine,

wherein the FIR filter reproduces the near-end echo and near-end crosstalk interference in the signal received by the receiver in accordance with the plurality of filter coefficients generated by the LMS engine; and

a combining circuit in communication with the receiver and the FIR filter,

wherein the combining circuit subtracts the reproduced near-end echo and near-end crosstalk interference from the signal received by the receiver.

109. (Previously Presented) The apparatus according to Claim 107, wherein β is substantially equal to an inverse of a number of transmitted symbols.

110. (Previously Presented) A method for removing near-end echo and near-end crosstalk interference from a received signal that is simultaneously received with a transmitted signal, comprising the steps of:

a) generating a plurality of filter coefficients each time period representing the near-end echo and near-end crosstalk interference on the received signal according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from a previous time period,

$Cj(k+1)$ is the filter coefficient for a current time period,

$x(k+1)$ is the signal received during the current time period,

$b(k-j)$ is the transmitted signal delayed by **j** delay units,

$(1-\beta)$ is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor; and

b) finite impulse filtering from the received signal the near-end echo and near-end crosstalk in accordance with the plurality of filter coefficients generated in step (a).

111. (Previously Presented) The method according to Claim 110, wherein β is substantially equal to an inverse of a number of transmitted symbols.

112. (Previously Presented) A method for removing near-end echo and near-end crosstalk interference from a received signal that is simultaneously received with a transmitted signal, comprising the step of:

a) generating a plurality of filter coefficients each time period representing the near-end echo and near-end crosstalk interference on the received signal,

wherein the plurality of filter coefficients for a current time period comprise a sum of a corresponding coefficient from a previous time period weighted by a first leakage factor and a product of a signal received during the current time period and a time-delayed transmitted signal, wherein the product is weighted by a second leakage factor

113. (Previously Presented) The method according to Claim 112, further comprising the step of:

b) finite impulse filtering from the received signal the near-end echo and near-end crosstalk in accordance with the plurality of filter coefficients generated in step (a).

114. (Previously Presented) The method according to Claim 112, wherein each of the plurality of filter coefficients are generated according to the formula:

$$C_J(k+1) = (1-\beta) * C_J(k) + \frac{\beta}{\sigma^2} * x(k+1) * b(k-j)$$

wherein:

$C_j(k)$ is the filter coefficient from the previous time period,

Cj(k+1) is the filter coefficient for the current time period,

x(k+1) is the received signal during the current time period,

b(k-j) is the transmitted signal delayed by **j** delay units,

$(1-\beta)$ is a first leakage factor,

σ^2 is a variance of a transmitted symbol, and

β/σ^2 is a second leakage factor.

115. (Previously Presented) The method according to Claim 114, wherein β is substantially equal to an inverse of a number of transmitted symbols.